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SYSTEM REQUIREMENT SPECIFICATION OF MOBILE APPS FOR SHRIMP FARMING IN SHYAMNAGAR OF BANGLADESH

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ABSTRACT

Frozen food is one of Bangladesh's most valuable export items, comprising more than 80% of shrimp. The most cultivated area of shrimp is situated in the southern region of Bangladesh. This research was carried out to identify the core problem in the shrimp farming areas in order to support the related farmers in seeking a solution through the most common technology used by them. The study was conducted in Shyamnagar, Satkhira district with a total of 40 female respondents involved. This research showed that shrimp farming is pressurized by a lack of proper information on disease identification and its management. Mobile apps are considered the most common information providers among that community. The research defined the common problems and necessity through the system requirement specification (SRS) to provide needed details for the farmers that focused on mobile-app development eventually. It was found that disease (82.86%) and water quality (17.14%) are the most common issues while among the diseases *White Spot Syndrome Virus* and *Yellow Head Virus Disease* followed by *Black Gill disease* were the most alarming to handle without pre-management knowledge. The research also suggests developing voice-based mobile apps for shrimp farmers in the local language.

Keywords: SRS, Mobile App, Shrimp Cultivation, ICT for Agricultural Development, Common Diseases of Shrimp

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INTRODUCTION

The Black Tiger Shrimp (*Penaeus monodon*, locally known as Bagda) is cultivated on the saline coastal floodplains and cultured in captive waterbodies locally called “Gher ". In Bangladesh, Borokupot village, Shyamnagar, Satkhira district is one of these areas where the livelihood of the most local people depends on shrimp farming. Shrimp is called white gold of Bangladesh and is exported as a second largest frozen food item, which covers about 3% of total export. Bangladesh captured 2.5 % of the world shrimp market. Bashir Uddin et. al. (2013) found that aquaculture is the most promising sector of Bangladesh contributing 3.65% of total Gross Domestic Products (GDP). Aminur Rahman et. al, (2018). But the shrimp cultivation is pressurized by natural disaster, diseases, lack of appropriate knowledge and information to identify the disease and its management. The farmers are still depended on the traditional methods of its management. Research team of Roshidul Hasan et. al, 2020, conducted a survey recently and found disease and water quality are the common problems in shrimp cultivation. Farmers are lacking of information on appropriate methods for disease and water quality management. The use of ICTs (radio, mobile phones and television) for sharing agricultural information was found to influence fish productivity (Benard R. et.al 2018).

It was considered the Information and communication activities are a fundamental element of any rural development activity. The mobile is widely used in many countries for fish farming. Mercy Amrita et.al. (2016) stated their opinion about mobile phones used by fishermen that “Mobile phones by virtue of their role as carrier and conduct of Information, had reached great heights in Markets. The “AkuaHub” developed by Sharihan Fathi, et.al. (2018) is a web-based tool that shares information among aquaculture players timely and efficiently especially on disease outbreak and disaster. Razaque Chhachhar A. and Zobidah Omar S. (2012) stated Mobile phones have added lots of easy issues in the life of fishermen and provides need-based information to the fishermen. In the case of Bangladesh, the situation is going forward though still lagging behind. Recently the information focused more on crops and slowly moving into the livestock sectors. Roshidul H. et.al. (2018) developed mobile app for Maize cultivation Nilphamari district of Bangladesh where local (Bengali) language. The mobile phone has reduced the gap among traders and farmers and same time farmers directly communicate with buyers and customers to find the good price of their product (Huda S. et. Al., (2017), Michael Kremer and Fossoun Houngbo G. (2020) stated in the agenda of World

Economic forum in July 2020 that the Digital agriculture where farmers use digital technologies to access useful information – could revolutionize how communities secure their livelihoods. It is necessary to provide appropriate real time information to the farmer's hand, and mobile application could fulfill the purpose easily. But Mobile app must develop by considering farmer's need. This is why it is very much essential to find out the System Requirement Specification (SRS), a structured collection of information that embodies the requirements of a system, can help taking Mobile app initiatives in case of required decision and reducing the vacuum in information. Focusing on the right point, this paper aims to analyze a mobile app based solution on the farmer's requirement in local language and accent in recorded voice.

The objective of this research was:

- To find out the common diseases persist in shrimp farming and traditional methods and mitigation.
- To assess and find out the solution for identified problems
- To finalize the system requirement specification (SRS) for developing mobile app.

RESEARCH METHODOLOGY

The research was conducted from July 2018 and ended in December 2019. The area of the research was in Satkhira district in Bangladesh.

Data Collection approaches and methods

The study employed both quantitative and qualitative approaches. Both primary and secondary data were collected. It employed a cross-sectional research design in collecting primary data where data were collected once from individual fish farmers who were the sampling units of the study. Quantitative data were mainly collected using a structured questionnaire while qualitative data were collected from key informant interview and focus group discussions.

The research was considered both the qualitative and quantitative approach to collect data. Both primary and secondary data were collected. The primary data was collected directly from the farmer's interview with structured questionnaire and the focus group discussion (FGD) specially using structured questionnaires of respondents. The individual farmers and Shrimp traders considered for qualitative and quantitative as key informant. The Shrimp

traders were selected for interviews and FGD using random sampling methods. Interviews were conducted in the village with 40 female farmers. Five different sets of questionnaires were designed and used for the research.

Questionnaire A: Primary information of Principle Respondent

Questionnaire B: Demographic of Economic Information

Questionnaire D: Community Interaction

Questionnaire E: Questionnaire related to Shrimp diseases

Questionnaire F: Questionnaire related to shrimp farming management

Data Analysis

The survey and FGD was conducted to find out common problems and how the farmers cultivating Shrimp as well as what problem they were facing during cultivation and how they could mitigate those issues. The quantitative data rechecked and entered into Statistical Package for Social Sciences (SPSS). The SPSS were used to analyze the data. Mainly the descriptive statistics and frequencies were considered for analysis. The comparison and results of analysis were used to find out the followings;

- Usability and adoptability of information and communication technologies, especially smartphones for the shrimp farming communities

- Find out the common problems usually related to shrimp farming.

- Adaptable solution for fishermen using mobile app

RESULT AND DISCUSSION

The research was focused to find out system requirement specifications for developing mobile apps for the shrimp farming communities. During the research, respondents were selected those who were directly involved in shrimp farming. The respondents were in different age groups and all respondents were female farmers. It was urged to follow the bottom-up approach to develop mobile apps so that end-users could adopt and sustain the research outcomes longer. During the research it was trying find out the cultural practice, expenditure of the farming communities, the yield, profit, problems, management practices of

the shrimp farming, and finally Information and Communication Technologies used in their day life.

Most of the respondents were between 20 years to 30 years' age group (89%), no respondents were found more than 50 years old. There were 6% of 30-40 years' age group respondents and 3% of 40-50 years age group as well as 3% of less than 20 years age group.

Most of the respondents completed Higher Secondary Certificate (HSC) and none of them were found illiterate, 37% of total had education level of Secondary School Certification (SCC) -HSC, 31% were in between Primary-SSC, 23% have education above HSC. Moreover, 9% of them could read and write in Bengali (shown in Fig. 1).

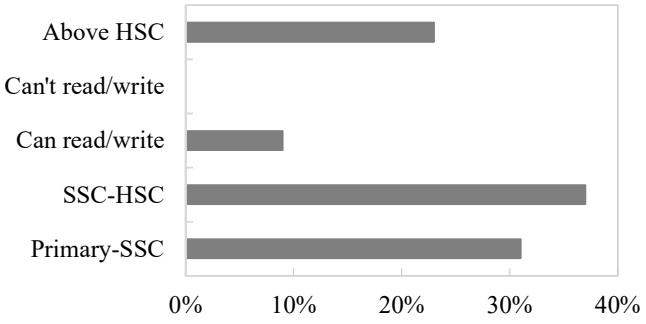

Fig. 1. Education Level of the respondents

The research found the most popular aquaculture system was Integrated Culture System (66%) where several seasonal crops, vegetables are cultivated on the embankment of shrimp gher. Besides, polyculture with different white fish species like Rui, Tilapia and other shrimp species like Harina, Crab fattening found another common practice (26%) in that area. In fig. 2 represented the farm size of shrimp farming in the study area based on the responses of the respondents. It was found that 26% of the respondents cultivated Shrimp in less than 0.5 acre of land, 26% of respondents were having land from 0.5 to 1 acre. The highest no of respondents was 31% cultivated shrimp in 1-3 acre of land. The rest 17% were getting shrimp production from more than 3 acre of gher.

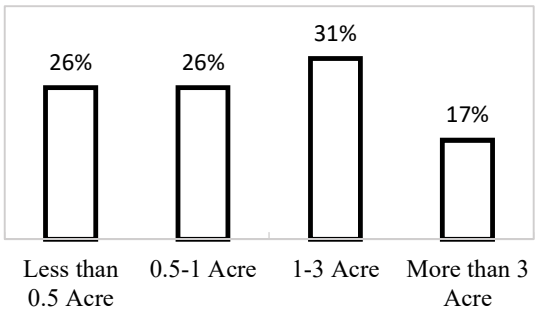

Fig. 2. Land size of the respondents cultivating shrimp

The research was trying to find out the usability and adoptability of information and communication technologies, especially smartphones. It was found to have a very positive response from the study. All the respondents were having smartphones and the highest no of respondents (60%) used their smartphone for getting information online and using online and offline mobile apps. The next responses were social media (34.29%) while 5.71% of them used smartphones while reading the newspaper. The fig. 3. depicted the assistance received when farmers were having any farming related problem, 57.50% directly called Winmiyaki, an NGO call center by PROTIC-Oxfam in Bangladesh. Many of them (25%) tried to solve the existing problem themselves, 15% among them consulted with the Upazila Fisheries Officer (UFO) and only 2.50% were getting assistance from the neighbor.

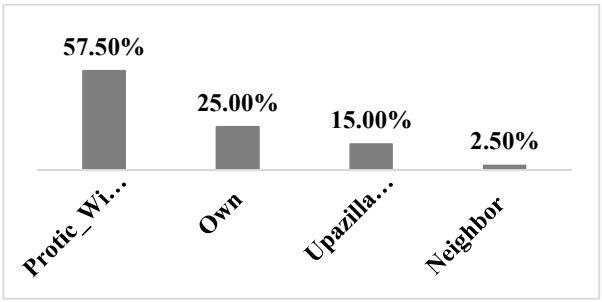

Fig. 3. Respondents were getting assistance from different sources

Fig. 4. Is showing the stocking density and it was varied according to the gher size. Total of 15% from the total stock less than 1000 shrimp post larvae, the other 18% of them stock more than 6 thousand. The fig.4. was also showing 21% of the respondents kept in ponds 2000-4000 while 4000-6000 shrimp post larvae are stocked by 21% farmers. But the highest no of respondents (26%) maintained 1000-2000 stocking density.

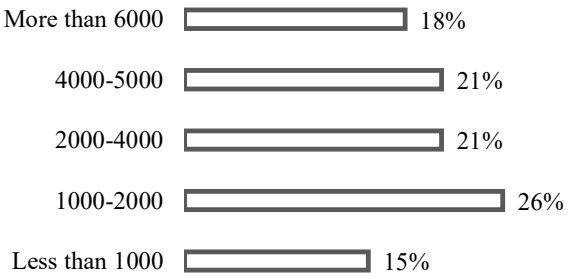

Fig. 4. Stocking density of the shrimp

The respondents were asked about five problems usually related to shrimp farming. Remarkably, it was found that the disease (82.86.%) as the most vulnerable problem persist in shrimp farming. The Water Quality management (17.14%) had taken the rest of the space of the existing problems. This was found strong correlation and important feedback for SRS.

Viral disease was very common in shrimp farming regions of Bangladesh represented in fig. 5. The respondents were asked about the most harmful disease they usually find in the gher during the whole farming period. All the respondents claimed that the White Spot Syndrome Virus disease (WSSV) was a common disease followed by Yellow Head Disease comprises 55% and Black Gill Disease (25%). Only a single respondent replied "no disease occurrence" and it was found after the FGD, the farmer had just started the Shrimp farming.

In Fig. 6. Found the existing management practice by the respondents where the small-scale shrimp farmers (80.00%) showed using Lime as a solution in case of Viral and Bacterial diseases. Total of 2.50% used medicine at first place while 5.00% tried to exchange the water with clean groundwater. Only 2.50% used probiotics knowingly or unknowingly with supplemented feed.

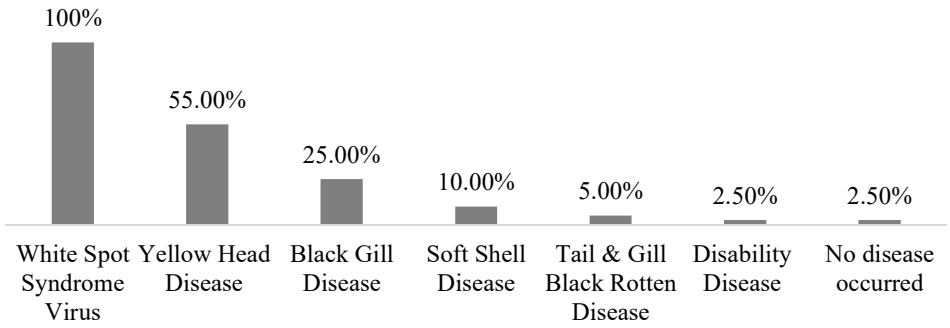

Fig. 5. Common disease of shrimp farming

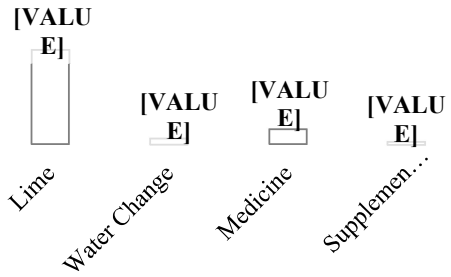

Fig. 6. Found the existing management practice.

The research found through surveys and FGD that the total of 80% shrimp ghers were affected by white spot disease and it became a limiting factor for small-scale Baghda farming and most of the farmers lost their production and it remained the same for the long.

Considering the following latest review of literatures, the research found promising and mobile app is necessary to developed based on farmer's requirement. The farmers could digitally equip for their farming management and practices.

The World Economic Forum stated in their agenda that digital technologies can particularly improve the lives of farmers and agricultural workers written by Kremer M et.al. (2020). Arpita Sharma et. al. (2019) found that the mobile apps being the way of life, there is an urgent need that fisheries sector partner with Information Technology providers and come out with sustainable solutions using mobile apps. This will be visionary for achieving sustainability and profitability. Another research also found by Roshidul H. et. Al. (2016) that the farming communities preferred image and voice based app instead of only text.

As the results of the study depicted that adaptability of mobile app by the farmers are not a problem at all and the identified common diseases need to be considered as the content of mobile app.

CONCLUSIONS

This research found that the water quality and disease management were the main problems at Shyamnagar area, Shatkhira which was hindering the profit and all labor served in every culture period by the farmers at that particular area. The main obstacle of production in shrimp farming that farmers were having little knowledge on water quality and disease

management. It was found that the increasing of disease, decreasing shrimp production. White Spot Syndrome Virus disease was the most common and severe problem for Baghda farming in Bangladesh. It was found that all the respondents were comfortable in using mobile phone applications i.e. browsing, chatting, audio & video playing, gamification, social networking and even learning, offline mobile phone app etc. It was identical that farmers were ready to accept the mobile app but it was necessary to find the appropriate and need-based information for the farmers. The research suggested to prepared a mobile app for i) Three main disease identification (a. *White Spot Syndrome Virus*, b. *Yellow Head Virus Disease* and c. *Black Gill disease*); ii) Disease management, iii) Gher Preparation and iv) Mobile app should be in local language and voice and image based solution

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